Estimating the Abundance of Arboreal Forage Lichens

Land management Handbook
FIELD GUIDE INSERT 7

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PURPOSE OF THIS HANDBOOK

Mountain caribou are a unique component of British Columbia's rich wildlife resource. These caribou spend much of the year in high elevation forests and during winter feed almost exclusively on arboreal lichen (lichen growing on trees).

Increasingly, timber harvesting has advanced into caribou habitat. The impact of this harvesting can be substantial, since the removal of trees means the removal of lichen; clearcutting eliminates all arboreal lichen within a cutblock. Because lichen spreads and grows slowly, a century or two may pass before a clearcut will again supply lichen for caribou.

To facilitate the integrated management of timber and caribou, forest and wildlife managers need to know the abundance and distribution of forage lichen in specific areas to help them decide:

1. whether logging should proceed and, if so,
2. where it should take place,
3. how much area should be logged, and
4. what type of logging would be appropriate.

This handbook describes a method to gather lichen abundance information for forest and wildlife managers.

HOW TO USE THE HANDBOOK

This handbook will help users estimate:

- proportions of the two main types of forage lichen, and
- overall abundance of the forage lichen.

The first part of the handbook introduces the two types of lichen. Photos showing various mixes of the two types are provided for users who need to estimate percentages.

The second, and major part, of the handbook is a guide to rating overall lichen abundance. It includes two sets of photo series, showing boundaries between lichen classes:

1. illustrates individual trees with different amounts of lichen, and
2. shows the same photos, but arranged to facilitate comparison between different trees.

The final part of the handbook provides more information on the zone within a tree in which to estimate lichen abundance and explains how the classes relate to actual lichen biomass. It also includes suggestions for further reading.

TYPES OF LICHEN

Many species of lichen grow on trees. Some are flat and leaf-like, others are scaly and crust-like, while still others are hair-like, resembling beards. In the Engelmann spruce — subalpine fir forests of British Columbia, the most abundant beard lichens are *Alectoria* and *Bryoria*.* They are the main winter food of mountain caribou.

Although *Alectoria* and *Bryoria* often grow together, they may respond differently to forest management. It is sometimes important to know how much of each is present. The photos on the facing fold-out are a guide to users who need to estimate percentages of each type.

ALECTORIA
(yellow-green)

BRYORIA
(brown, greyish, or almost black)

* In other areas or other forest types, users may encounter different kinds of lichen that look similar to *Alectoria* and *Bryoria*.

ALECTORIA

10%

BRYORIA

90%

ALECTORIA

40%

BRYORIA

60%

ALECTORIA

20%

BRYORIA

80%

ALECTORIA

70%

BRYORIA

30%

CLASSIFYING LICHEN ABUNDANCE

The objective is to classify each tree into one of six lichen abundance classes. These classes are based on the actual weight of the lichens (all *Alectoria* and *Bryoria* combined) on the trees.

Only lichens below 4.5 m high on the trees are included in the rating. In the photos, the 4.5-m point is indicated by the top of the height pole positioned against the trunk. Lichens up to this height are available to caribou when they are standing on a deep, settled snowpack.

The general impression of lichen abundance in a tree varies with the growth form and the vigour of the tree. Three photo series are provided:

Series A: mostly living branches
Series B: mixed living and dead branches
Series C: mostly dead branches

Photos are provided for all the class boundaries, except between Class 0 and Class 1. Class 0 is reserved for trees with no noticeable lichen at all. Trees having even a single wisp of lichen belong in Class 1.

For simplicity, the photos show only *Alectoria*. In practice, however, *Bryoria* must also be included in the estimates of overall abundance.

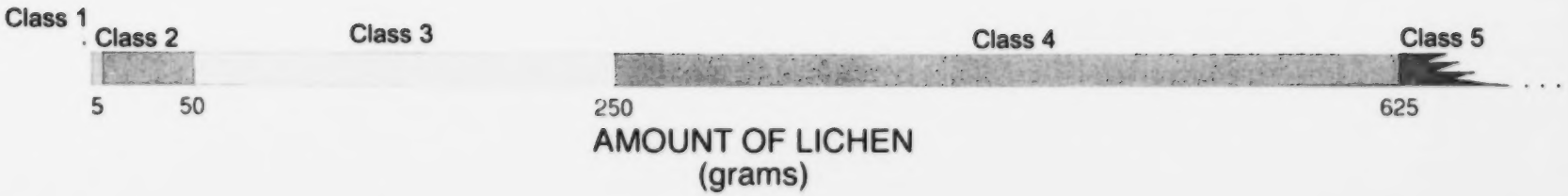
fold out page

HOW TO CLASSIFY A TREE

STEP 1 Decide which photo series (A, B, or C) best matches the tree, and use it to determine roughly into which class the tree fits.

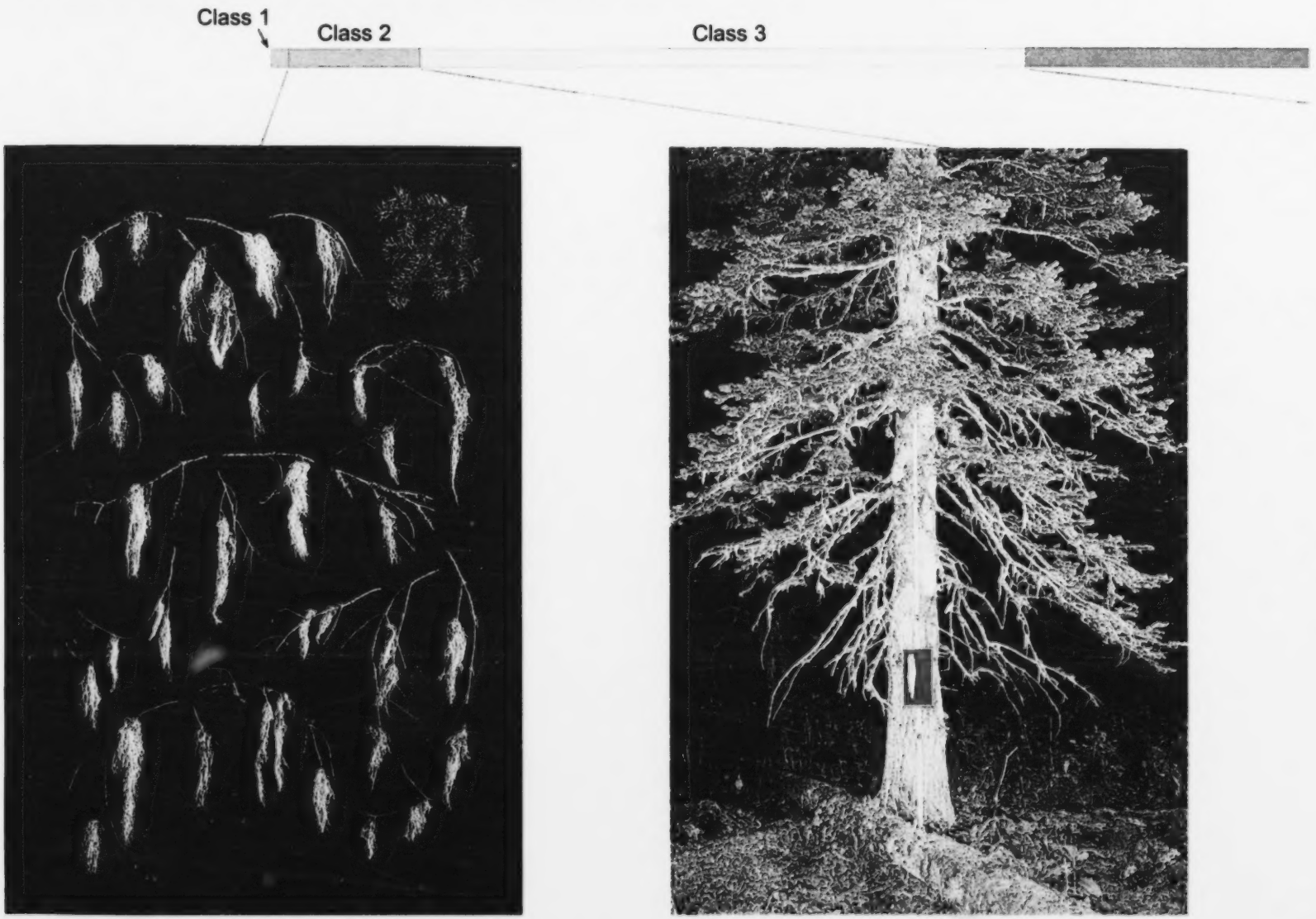
STEP 2 Turn to the photos that distinguish the classes closest to your estimate and confirm your classification.

Remember: All photos show *boundaries* between classes. Only lichen below 4.5 m should be included in your estimate. (see "Zone of Lichen Estimation," p. 20).



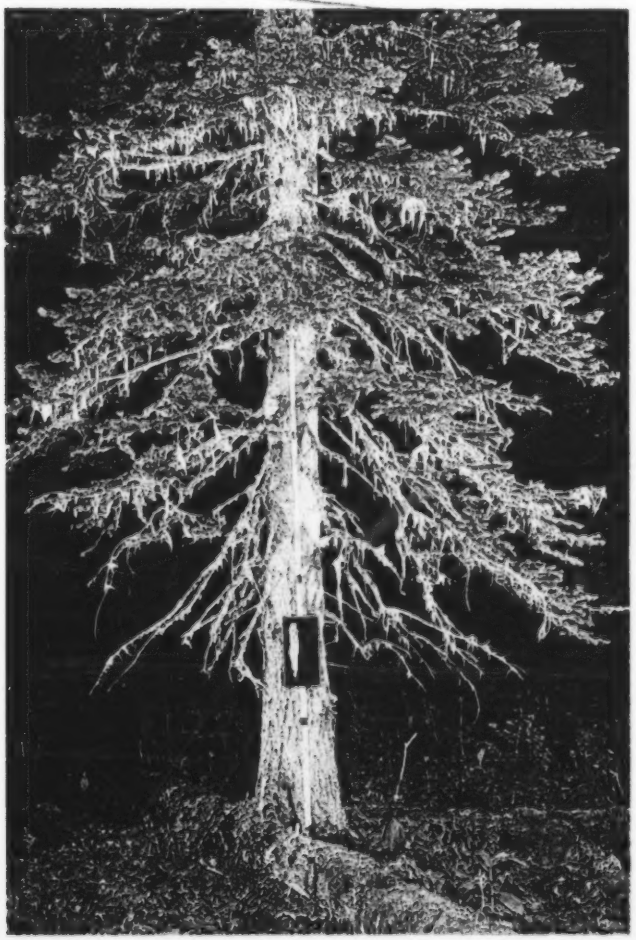
SERIES A: MOSTLY LIVING BRANCHES

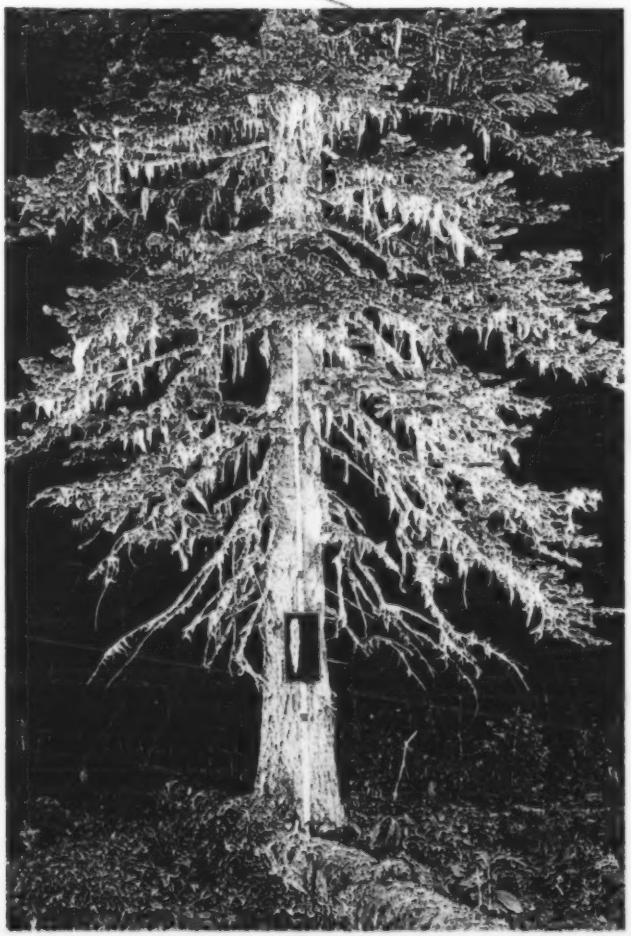
Photos illustrate boundaries between classes



Class 4

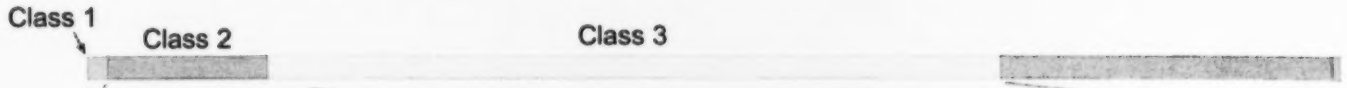
Class 5

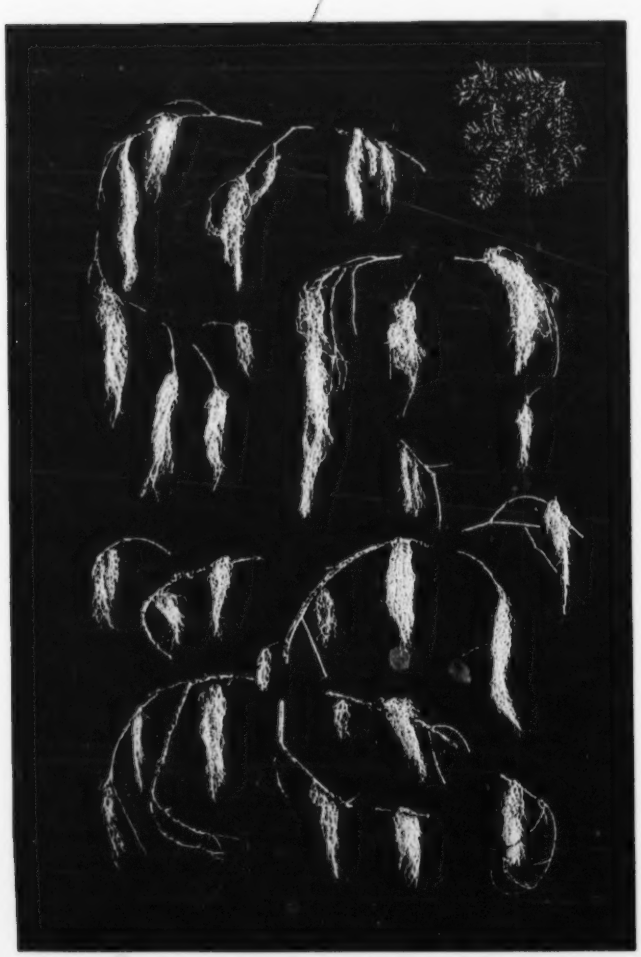




SERIES B: MIXED LIVING AND DEAD

Photos illustrate boundaries between classes

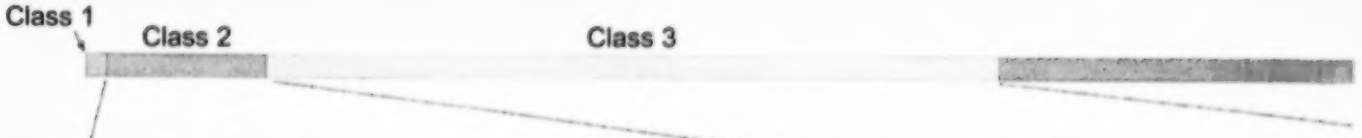


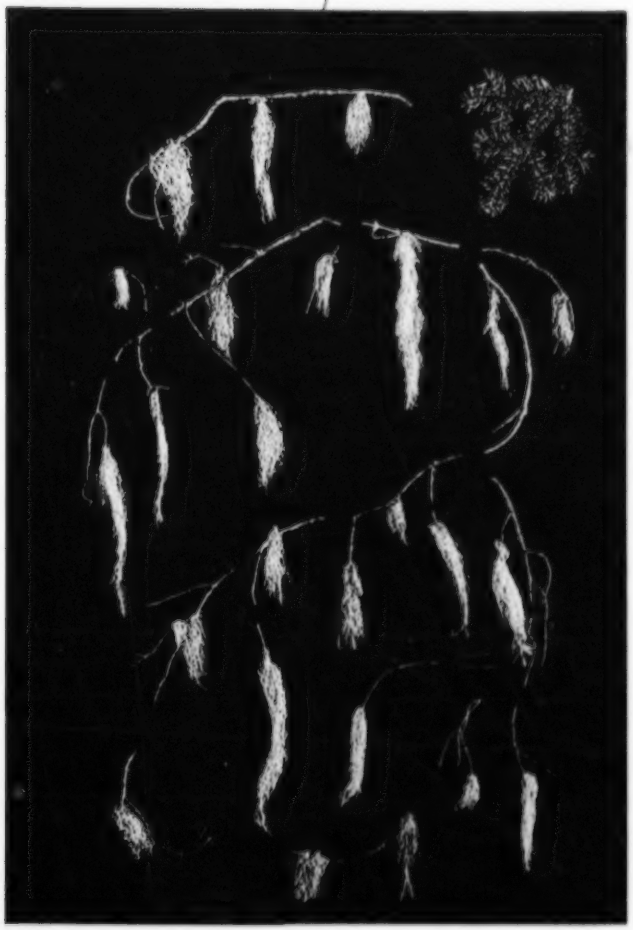


BRANCHES

SERIES C: MOSTLY DEAD BRANCHES

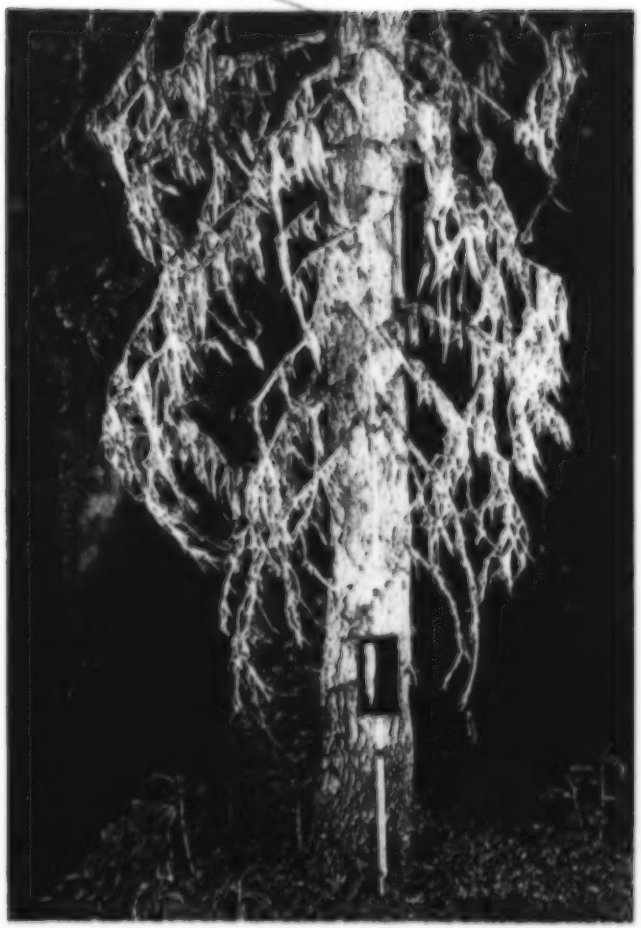
Photos illustrate boundaries between classes





Class 4

Class 5



DISTINGUISHING CLASSES 1 AND 2 (three

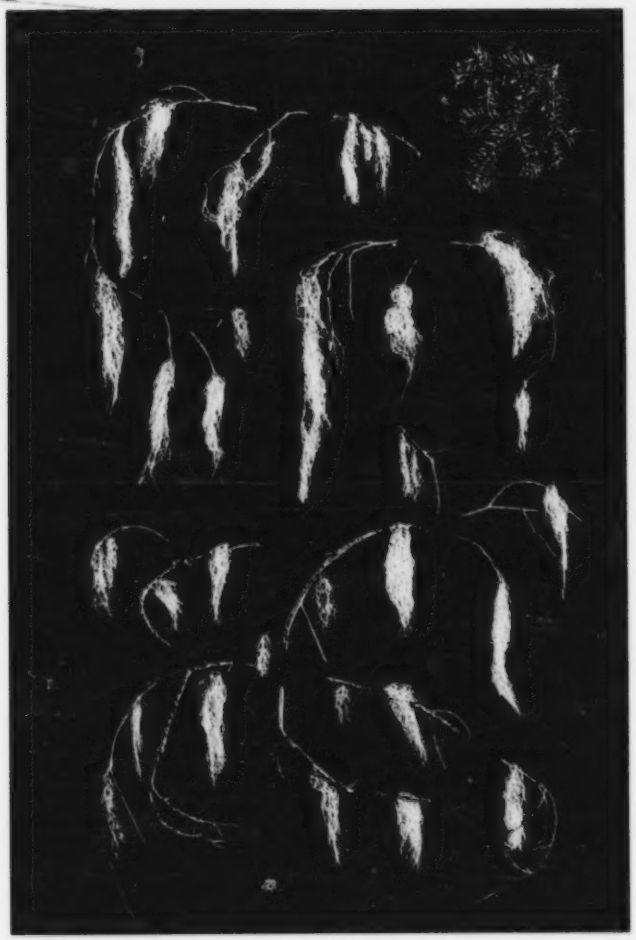
Less than this amount of lichen on tree ..... CLASS 1 or lower
More than this amount of lichen on tree .....CLASS 2 or higher

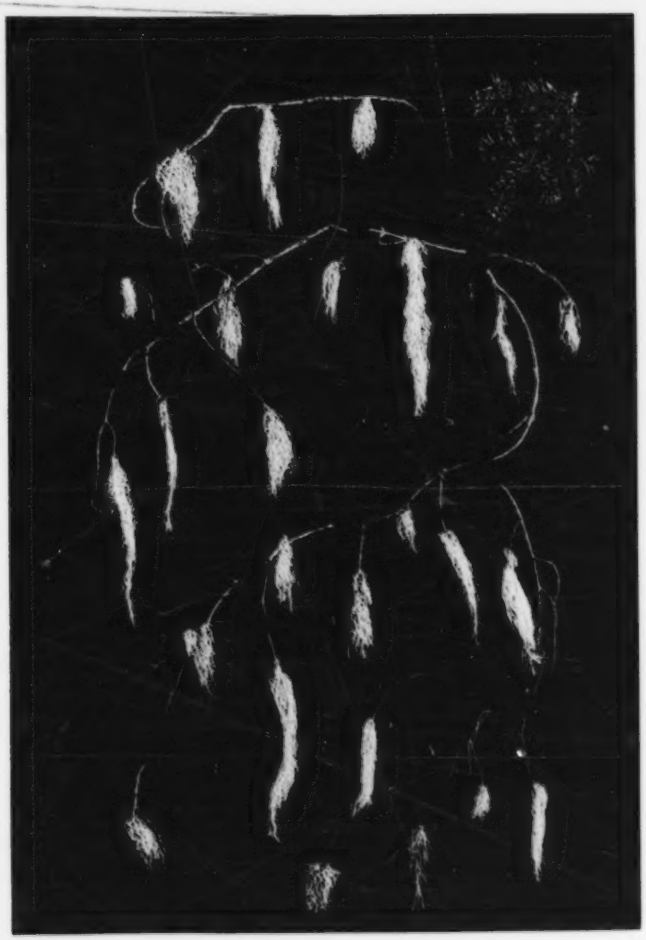
fold out page

examples)

Class 4

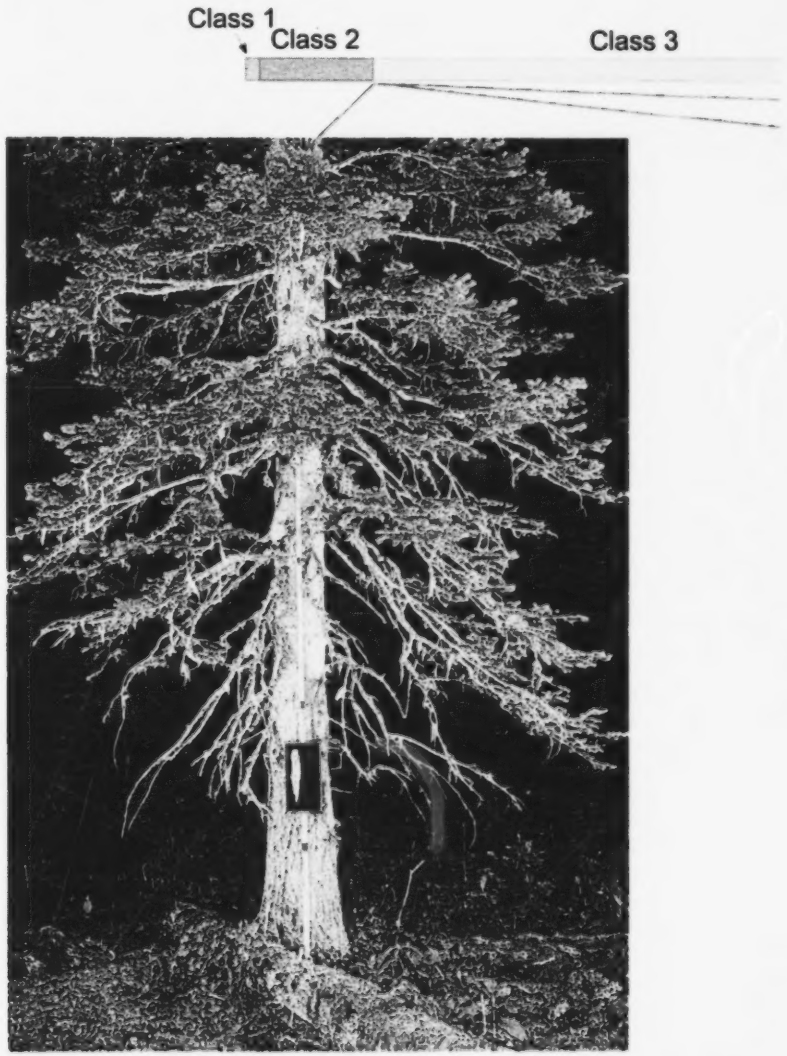
Class 5





DISTINGUISHING CLASSES 2 AND 3 (three

Less than this amount of lichen on tree ..... CLASS 2 or lower
More than this amount of lichen on tree .....CLASS 3 or higher



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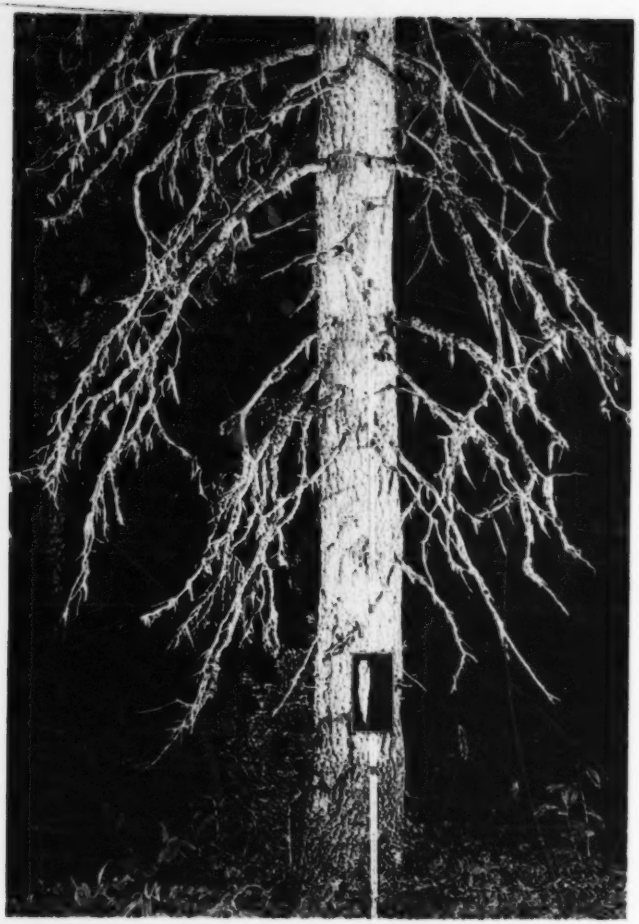
examples)

Class 4

Class 5

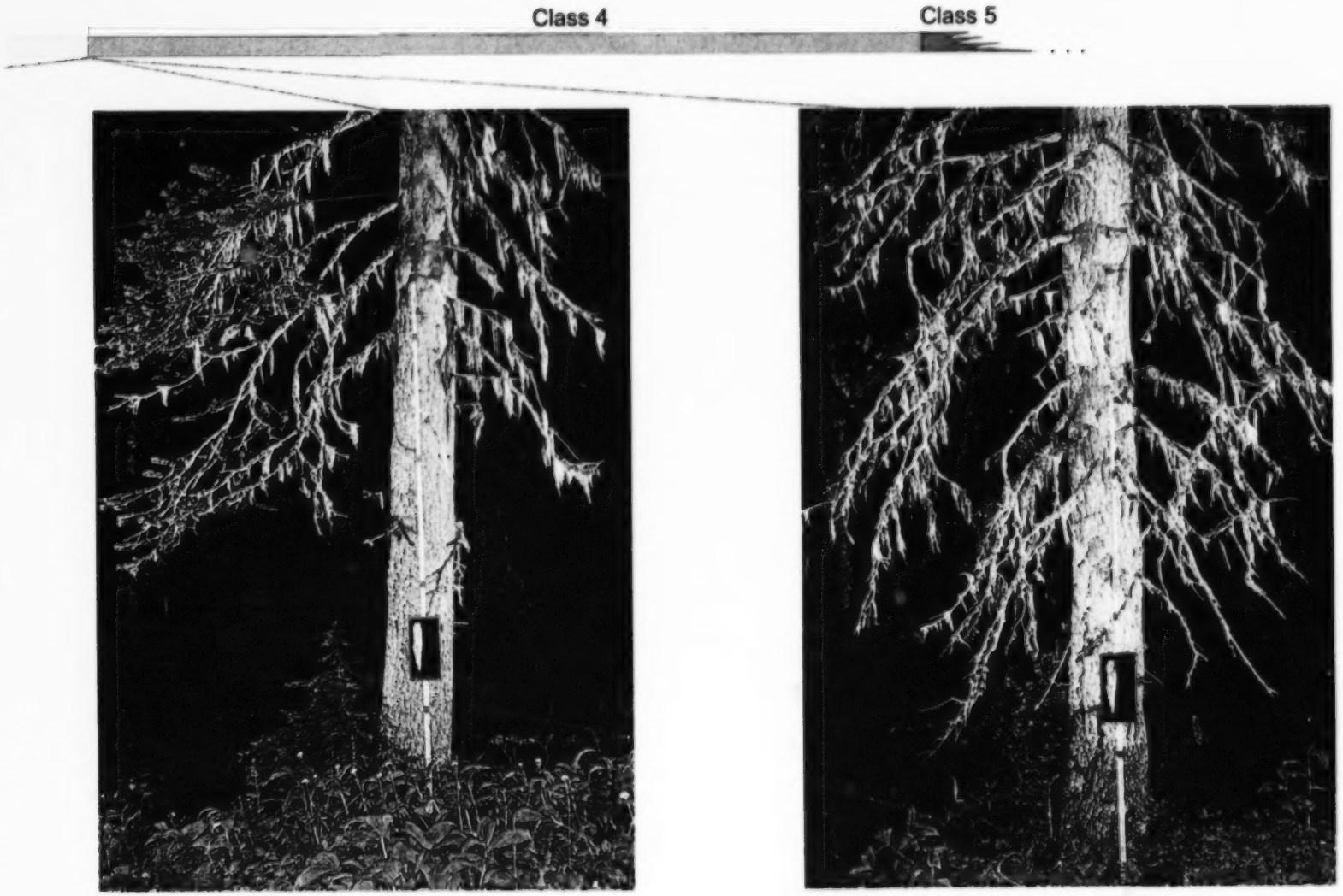


DISTINGUISHING CLASSES 3 AND 4 (three

Less than this amount of lichen on tree ..... CLASS 3 or lower
More than this amount of lichen on tree .....CLASS 4 or higher

fold out page

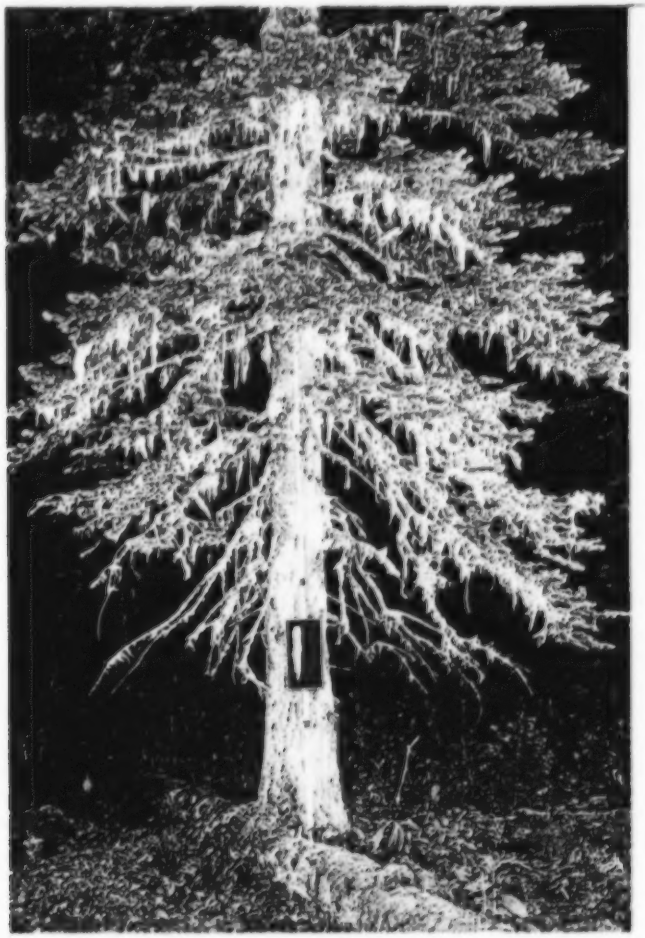
examples)



DISTINGUISHING CLASSES 4 AND 5 (three

Less than this amount of lichen on tree ..... CLASS 4 or lower
More than this amount of lichen on tree .....CLASS 5

Class 1
Class 2
Class 3



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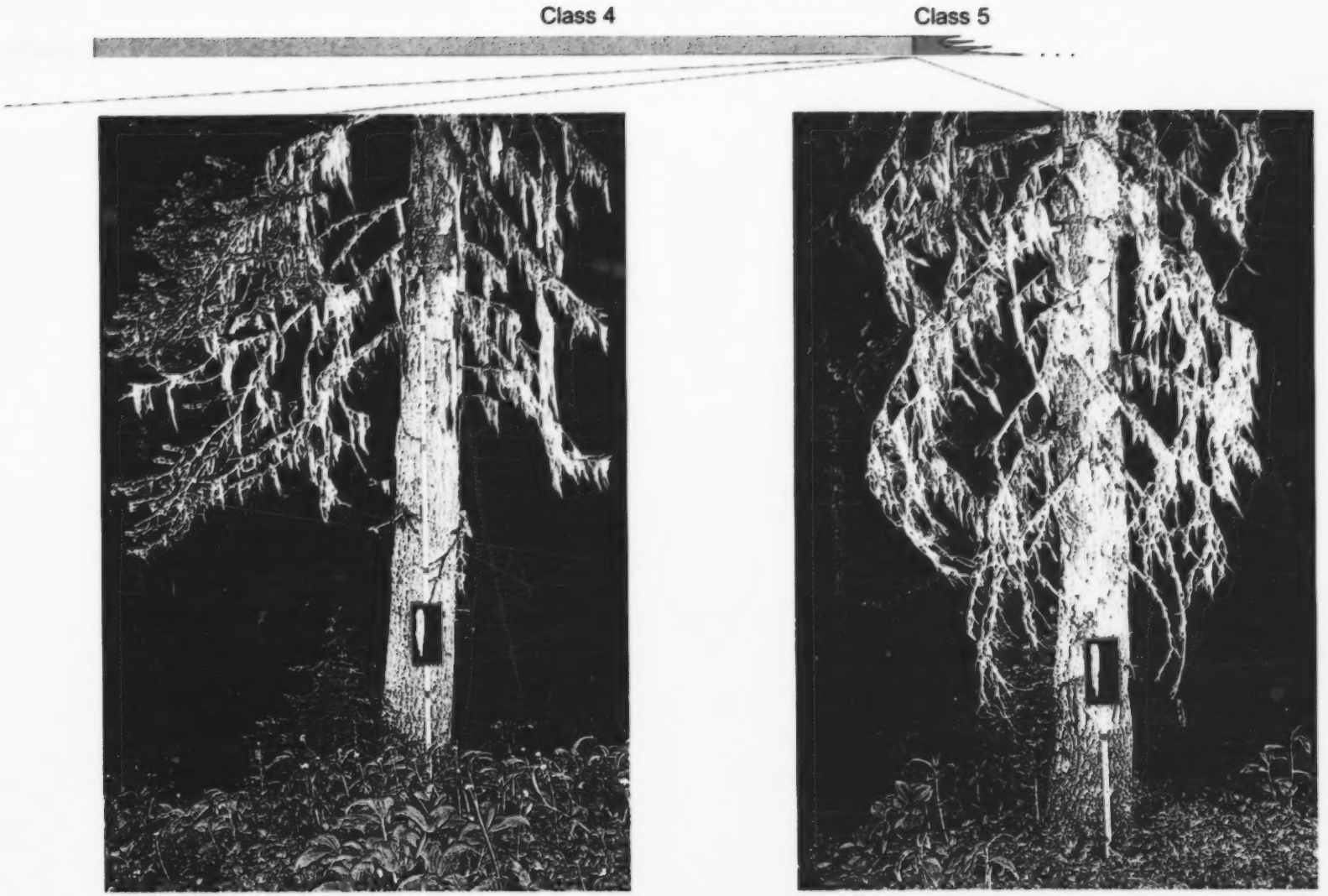
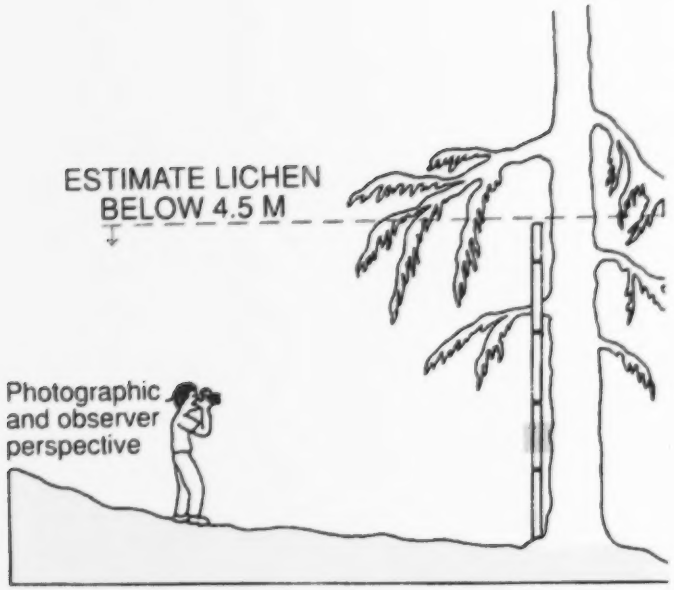
examples)



TECHNICAL BACKGROUND

Zone of Lichen Estimation



Be careful only to include lichen below 4.5 m. The photographic and observer perspective is deceiving. Branches in front of the height pole may appear to be above the estimation zone, but are actually below 4.5 m; while brances behind the pole may appear to be within the estimation zone but are actually above 4.5 m.

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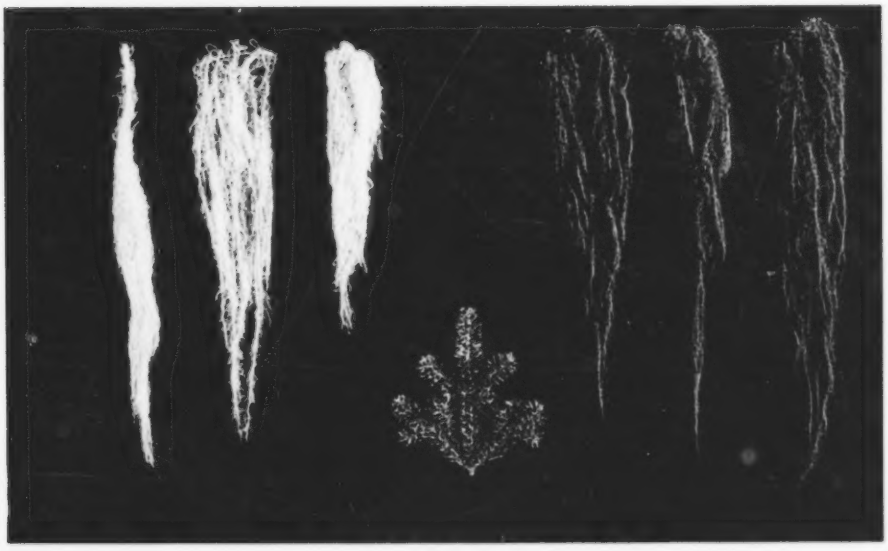
Relationship of Lichen Classes to Biomass

For most users, the six lichen classes presented in this handbook will be adequate. Researchers may wish to use the photo series as the basis for more detailed estimates of lichen abundance. A 5-g clump of lichen may be used as a standard unit of measure. Such a clump is shown in the box on the height pole in the photos.

Class	Quantity of lichen (g)	Quantity of lichen (5-g clumps)
0	0	0
1	>0 – 5	>0 – 1
2	>5 – 50	>1 – 10
3	>50 – 250	>10 – 50
4	>250 – 650	>50 – 125
5	>625	>125

Each of the clumps below is 5 g of lichen (*Alectoria* on left, and *Bryoria* on right).



In Conclusion

This handbook was developed primarily for use in the Engelmann Spruce — Subalpine Fir Biogeoclimatic Zone for British Columbia, where *Alectoria sarmentosa* and *Bryoria* spp. are the most abundant beard lichens. Other lichens that are similar in apperance are abundant in other places. Some references for lichen identification are given below.

Further Reading

Brodo, I.M. and D.L. Hawksworth. 1977. *Alectora* and allied genera in North America. Opera Botanica 42:1-164.

Hale, M.E. 1979. How to know the lichens. 2nd ed. Wm. C. Brown Co., Dubuque, Iowa. 246 p.

Vitt, D.H., J.E. Marsh and R.B. Bovey. 1988. A photographic field guide to the mosses, lichen, and ferns of northwest North America. Lone Pine Publishing, Edmonton, Alta. 296 p.